

I claim:

1. A tissue press for shaping a piece of tissue to a particular overall shape for implantation, comprising:

first and second relatively movable members connected with each other;

said first member having a surface portion receiving a selected one of a plurality of first forming elements of predetermined shapes, said first forming element having a first forming surface for providing a first portion of the overall shape of the reshaped tissue,

said second member having a surface portion receiving a selected one of a plurality of second forming elements of predetermined shapes, said second forming element having a second forming surface for providing a second portion of the overall shape of the reshaped tissue,

said first and second forming elements being positionable on opposite sides of the piece of tissue to be shaped, and

actuator means connecting said first and second relatively movable members and operable to move said second forming element toward said first forming element to engage and shape the piece of tissue between the first and second forming elements.

2. A tissue press as defined in claim 1 wherein each one of said plurality of first forming elements is

removably received on said surface portion of said first member.

3. A tissue press as defined in claim 2 wherein each one of said plurality of second forming elements is removably received on said surface portion of said second member.

4. A tissue press as defined in claim 1 comprising means for draining off fluid from between said first and second forming elements.

5. A tissue press as defined in claim 1 comprising means for monitoring the amount of pressure applied to the piece of tissue in order to minimize tissue necrosis.

6. A tissue press as defined in claim 1 comprising means for limiting the amount of pressure applied to the piece of tissue in order to minimize tissue necrosis.

7. A tissue press as defined in claim 1 wherein said first and second forming elements when brought together define between them an open forming chamber.

8. A tissue press as defined in claim 1 wherein said first and second forming elements when brought together define between them a closed forming chamber.

9. A tissue press for shaping a piece of tissue to a particular overall shape for implantation, comprising:

a first forming element having a first forming surface for providing a first portion of the overall shape of the reshaped tissue;

a base member supporting said first forming element and including surface means for supporting said base member and thereby said apparatus on an external support surface;

a second forming element having a second forming surface for providing a second portion of the overall shape of the reshaped tissue, said first and second forming elements being positionable on opposite sides of the piece of tissue to be shaped;

a manually engageable member connected with said base member and supporting said second forming element, said manually engageable member being movable relative to said base member to move said second forming element toward said first forming element to reshape the piece of tissue between the first and second forming elements; and

means for blocking application to the piece of tissue of pressure in excess of a predetermined amount.

10. A tissue press as defined in claim 9 comprising means for draining off fluid which may be expressed from the piece of tissue.

11. A tissue press for compressing a piece of tissue,
comprising:

a base member;

a first compressing part on said'base member for receiving the piece of tissue thereon;

a movable member connected with said base member
and movable relative to said base member;

a second compressing part on said movable member, said first and second compressing parts being positionable on opposite sides of the piece of tissue when the piece of tissue is received on said first compressing part; and

said movable member being movable toward said base member to move said second compressing part toward said first compressing part to compress the piece of tissue between the first and second compressing parts.

12. A tissue press as defined in claim 11 wherein said base member includes surface means for supporting said base member and thereby said apparatus on an external support surface, said movable member being pivotally supported by said base member.

13. A tissue press as defined in claim 11 wherein said first and second compressing parts each include a cylindrical surface portion and cooperate to compress tissue into a cylindrical shape.

14. A tissue press as defined in claim 11 comprising means for monitoring the amount of pressure applied to the piece of tissue.

15. A tissue press as defined in claim 14 wherein said means for monitoring pressure comprises a pressure sensor in one of said first and second compressing parts for sensing the amount of pressure on the piece of tissue.

16. A tissue press as defined in claim 14 wherein said means for monitoring pressure comprises display means for displaying the amount of pressure applied by said first and second compressing parts.

17. A tissue press as defined in claim 11 comprising means for limiting the amount of pressure applied to the piece of tissue in order to minimize tissue necrosis.

18. A tissue press as defined in claim 17 wherein said means for limiting comprises a pressure relief mechanism for blocking movement of said second compressing part, toward said first compressing part, upon the application of pressure to said piece of tissue in an amount above a predetermined amount.

19. A tissue press for compressing a piece of tissue, comprising:

first and second relatively movable support members connected with each other;

said first support member having a surface portion receiving a selected one of a plurality of first compression members having predetermined forms, said first compression member adapted to receive the piece of tissue thereon,

said second support member being movably connected with said first support member and having a surface portion receiving a selected one of a plurality of second compression members having various forms,

said first and second compression members being positionable on opposite sides of the piece of tissue to be compressed,

said first and second support members being relatively movable to move said second compression member toward said first compression member to engage and compress the piece of tissue between the first and second compression members;

means for draining off fluid which may be expressed from the piece of tissue to be compressed; and

means for limiting the amount of pressure applied to the piece of tissue in order to minimize tissue necrosis.

20. A tissue press for shaping a piece of tissue, comprising:

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first and second members;

a plurality of first forming elements of different predetermined shapes selectively engageable on said first member,

a plurality of second forming elements of different predetermined shapes selectively engageable on said second member,

said first and second forming elements when on said first and second members being positionable on opposite sides of the piece of tissue, and

said first and second members being relatively movable between a first spaced apart condition and a second condition in which said piece of tissue is held between said first and second forming elements.

21. A method of reshaping tissue for use as graft material comprising the steps of:

determining the shape which the tissue should possess as graft material;

providing a tissue press;

selecting forming elements adapted to press tissue approximately to the desired shape;

placing the forming elements on the tissue press;

placing the tissue in the tissue press between the forming elements;

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operating the tissue press to shape the tissue between the forming elements to give the tissue the desired shape; and

controlling the pressure on the tissue during said shaping step to minimize damage to or necrosis of the tissue.

22. A method of preparing tissue for use as graft material comprising the steps of:

determining the shape and size which the tissue should possess as graft material;

placing the tissue in a tissue press having forming elements adapted to press tissue approximately to the shape and size desired;

compressing the tissue in the tissue press to give the tissue the shape and size desired;

controlling the pressure on the tissue during the compressing step to minimize damage to or necrosis of the tissue; and

draining off fluid expressed during said compressing step.

23. A method as set forth in claim 22 further comprising the step of implanting the compressed tissue as graft material in a body opening in a compressed and defluidized condition whereby the compressed tissue will

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imbibe bodily fluids and form a mechanical interlock with the surface defining the body opening.

24. A method as set forth in claim 23 further comprising the step of placing a retaining member on the compressed tissue to maintain the compressed tissue in a compressed condition prior to implantation of the compressed tissue as graft material.

25. A tissue press for compressing or shaping a piece of tissue, comprising:

a first member, and a first forming element on said first member;

a second member connected with said first member, and a second forming element on said second member;

said second member being movable toward said first member to move said second forming element toward said first forming element to compress or shape the piece of tissue between the first and second forming elements; and

means for selectively controlling the temperature of the piece of tissue while it is being compressed or shaped.

26. A tissue press as set forth in claim 25 wherein said means for selectively controlling the temperature of

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the piece of tissue comprises means for heating the piece of tissue.

27. A tissue press as set forth in claim 25 wherein said means for selectively controlling the temperature of the piece of tissue comprises means for cooling the piece of tissue.

28. A tissue press for compressing or shaping a piece of tissue, comprising:

a first member, and a first forming element on said first member;

a second member connected with said first member, and a second forming element on said second member;

said second member being movable toward said first member to move said second forming element toward said first forming element to compress or shape the piece of tissue between the first and second forming elements; and

means for selectively removing excess tissue from the piece of tissue after it is compressed or shaped.

29. A pneumatic press for compressing or shaping a piece of tissue, comprising:

a first member, and a first forming element on said first member;

a second member connected with said first member, and a second forming element on said second member;

said second member being movable, upon the application to said press of fluid under pressure, toward said first member to move said second forming element toward said first forming element to compress or shape the piece of tissue between the first and second forming elements.

30. A tissue press for compressing or shaping a piece of tissue, comprising:

a first member, and a first forming element on said first member;

a second member connected with said first member, and a second forming element on said second member;

said second member being movable toward said first member to move said second forming element toward said first forming element to compress or shape the piece of tissue between the first and second forming elements; and

a non-stick coating on at least one of said first and second forming elements to limit adhesion of the piece of tissue while it is being compressed or shaped.

31. Apparatus for shaping a piece of tissue, comprising:

first and second relatively movable members;

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a plurality of first forming elements of different predetermined shapes selectively engageable on said first member;

means for connecting a selected one of said first forming elements with said first member;

a plurality of second forming elements of different predetermined shapes selectively engageable on said second member;

means for connecting a selected one of said second forming elements with said second member;

said first and second forming elements when connected with said first and second members being positionable on opposite sides of the piece of tissue; and

said first and second members being relatively movable between a first spaced apart condition and a second condition in which said piece of tissue is shaped between said first and second forming elements.

32. Apparatus as set forth in claim 31 wherein said means for connecting comprises respective surface portions on said forming elements and said members for slidably receiving said forming elements on said members.

33. Apparatus as set forth in claim 31 wherein said first and second forming elements include surface means for shaping the tissue into a flat shape.

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34. Apparatus as set forth in claim 31 wherein said first and second forming elements include surface means for shaping the tissue into a cylindrical shape.

35. Apparatus as set forth in claim 31 wherein said first and second forming elements include surface means for shaping the tissue into an oblong shape.

36. Apparatus as set forth in claim 31 wherein said first and second forming elements include surface means for shaping the tissue into a square shape.

37. Apparatus as set forth in claim 31 wherein said first and second forming elements include surface means for shaping the tissue into a triangular shape.

38. Apparatus as set forth in claim 31 wherein said first and second forming elements include surface means for shaping the tissue into a semicircular shape.

39. A method of preparing composite tissue graft material, comprising the steps of:

placing body tissue and at least one other element in a tissue press having forming elements adapted to press tissue approximately to the shape and size desired;

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44. A method as set forth in claim 39 wherein the other element is selected from the group consisting of antibiotics, bone growth enhancers, tri-calcium phosphate, hydroxyapatite, allografts and autografts.

45. A method comprising the steps of obtaining fibrin as a component from body tissue and using the fibrin as an adhesive.

46. A method as set forth in claim 45 further comprising the step of compressing the fibrin prior to using it as an adhesive.

47. A surgical implant made at least partially of a material which expands when it comes into contact with body fluids upon implantation into the body.

48. An implant as defined in claim 47 wherein said material is PEEK.

49. An implant as defined in claim 47 wherein said implant is a joint replacement part.

50. An implant as defined in claim 47 wherein said implant is a surgical stabilization element such as a plate, rivet, or screw.

51. A surgical implant as defined in claim 47 comprising a coating of a material which expands when it comes into contact with body fluids upon implantation into the body.

52. Apparatus for maintaining tissue graft material in a compressed condition, comprising a retainer for placement around the compressed tissue graft material prior to implantation of the compressed tissue graft material in the body.

53. Apparatus as defined in claim 52 wherein said retainer is a cage.

54. Apparatus as defined in claim 52 wherein said retainer is a mesh.

55. Apparatus as defined in claim 52 wherein said retainer is biodegradable.

56. Apparatus as defined in claim 52 wherein said retainer is made of a polymer.

57. Apparatus for maintaining tissue graft material in a compressed condition, comprising a retainer for placement around the compressed tissue graft material prior to implantation of the tissue graft material in the body, said retainer expanding after implantation in the body.

58. Apparatus as defined in claim 57 wherein said retainer is made of a material which is itself compressed

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59. Apparatus as defined in claim 57 wherein said retainer is made of a material which expands when it comes into contact with body fluids upon implantation into the body.

61. Apparatus as defined in claim 60 wherein said material is a desiccated biodegradable.